ON5809

1061 RETURN TO OISE

Hypertext and Computer Conferencing: Empowering the Online Learner

Catherine Chandler-Crichlow

Technical Paper # 17

Educational Evaluation Centre

Ontario Institute for Studies in Education

Spring, 1989

Copyright© Catherine Chandler-Crichlow 1989

92-07229/

ABSTRACT

The use of computer-based tools for managing and disseminating information has gained prominence in recent years. This paper examines the use of computer-mediated communication for educational activities and presents both advantages as well as current limitations of this sociotechnology. To address some of the limitations of computer conferencing systems as a medium of communication, of the new genre of computer software - hypertext - is examined in order to suggest methods by which the two systems could be productively interfaced.

INTRODUCTION

Information has existed throughout history and is today regarded as *" ... vital for the well being and security of the human society ..."* (Mangla1). Traditionally information has been collected and processed in analog form - text and symbols and can be found stored in books, journals, microfiche, audio-visual materials and other forms of storage systems. There is a critical need to consider alternate forms of information storage and management techniques to meet the continuous worldwide creation of information which has resulted from the *" ... gradual spread of the concept of democracy; universalization of the educational facilities; intensification of research activities by agencies such as governments, universities, research institutes, industries, etc.; and technological advances in the fields of communication, printing, reprography, computer data processing, etc."* (Manlga, 197 ; pp. 114)

The challenge that faces institutions today is to identify technological tools that can be used to manage the large corpus of information needed by organizations. These technologies are needed to provide rapid access to and dissemination of information. This need becomes even more critical when one considers the steady growth in size and complexity of institutions coupled with the increased geographic locations over which organizations need to communicate. Computer based information systems could revolutionize the flexibility, efficiency, accessibility and degree of sophistication with which information is managed and transmitted

While computer-based information systems present a viable option for coping with the imminent information explosion, they present a panacea for all information needs of organizations. The sheer speed with which these systems could store, manipulate and retrieve of information implies that more information is processed in less time. Such a situation could create a bottle-neck if this processed if this information is not disseminated. This would be especially critical to organisations needing information from varied sources for the decision making or for problem solving applications.

The need for organizational personnel to have on-going communication about the aims and objectives of the organization and the manner in which either political, social or economic impact on these strategic objectives is therefore crucial. Coupled with this,

is the perceived need for increasing the speed and accuracy with which information is shared both within and among organizations.

The use of effective communication strategies is germane to maintaining the social, economic and psychological vitality of organizations. Computer-based communication technologies are can improve the effectiveness of organisational communication since they provide "signals" which reinforce the strategic objectives of the organisation and provide the technological threads needed to support the decision making and problem solving for members of an organisation.

But in considering the vagaries of human existence it would be necessary for communication systems to

- transcend the boundaries of geographic location and time. As such computer-based commnication systems should support both synchronous and asynchronous transmission of information across dispersed sites.
- facilitate equitable access to information-sharing and dialogue, both among organizations as well as between the user in the field and the expert at any given location.
- maintain a permanent database of information transmitted in the system for retrieval and/or analytical purposes.
- allow for both "private" and "public" communication among users.
- provide features that help in reducing the error rate in the transmission of information and for the rapid interchange of information that the digital mode allows.

To reduce the cost while at the same time increasing the efficiency of information management and dissemination, it would be necessary to improve the interface between computer-based conferencing and information management systems. This notion is addressed by Cohen et al (1977) who state that:

> The technology and utilisation of information systems and communication systems have come to a point where the two are beginning to overlap. For the digital computer, a core ingredient for large scale information systems, is becoming an equally important factor in the switched telecommunications network. From the other perspective, we note that networks of computers and the construction of large time-shared information systems are dependent upon the availability of communication networks. Thus, it is not unreasonable to assume that one day the two systems may become a fully integrated, comprehensive information-communication system which would be reached through multi-purpose apparatus available to everyone.

COMPUTER-MEDIATED COMMUNICATIONS

There is a need to improve the dissemination of information among professionals. The constraints placed on educators to complete fixed syllabi in a defined time; to network with parents of their students to increase communication between the home and institution; to communicate with other collegues in other locations with whom they share similar interests; the cost, time and geographic restraints that the educator faces

in upgrading their skills, suggest the need for innovative methods of communication.

Closely paralleling this need to find alternative methods for supporting the professional development of educators, is a need to identify new methods for the dissemination of findings among educational researchers. Current channels for distributing research findings through paper-based interfaces such as journals and seminars has meant that this information is accessible to a rather limited sector of the educational community. A compounding difficulty for educational researchers is the onerous task of keeping abreast of findings from other disciplines such as computer science, sociology, psychology and others which impact on educational practice.

A dichotomy develops as individuals become more specialised in their field of interest. There is a simultaneous blurring of the lines of research between disciplines, a problem which was addressed in the 1940s by Vannevar Bush who stated:

> There is a growing mountain of research. There is increased evidence that we are bogged down by that information as specialization extends. The investigator is staggered by the findings and conclusions of thousands of other workers. These are conclusions which he cannot find time to grasp, much less to remember. Yet, specialization becomes increasingly necessary for progress, and the effort to bridge the disciplines is correspondingly superficial.

Computer-mediated communication can play a key role in solving problems of information access and dissemination. At the Ontario Institute for Studies in Education - OISE - the computer conferencing system PARTICIPATE,[1] has been used to provide online educational opportunities for educators.[2] (Harasim, 198 ; 198 ; 198) It has also been used as a mode of disseminating research findings to researchers and practitioners at distributed geographic sites. (Harasim & Winkelmans, 1988; Harasim & Crichlow, 1989)

Research conducted at OISE reveals that online education can enhance the knowledge building process by facilitating the processes of **knowledge acquisition, integration and the use of elaborations** in learning from this text-based environment. (Harasim and Crichlow; 1989) It has also been shown that the use of computer conferencing facilitates the networking of educators with similar interests in a environment that is both time and location independent. (Harasim, 1988; Harasim and Winklemans, 1988) In other settings in which computer conferencing has been used for educational purposes, it has been shown to augment the problem solving process (Rice, mmmmmm) But while the medium has been used successfully for educational purposes places a high cognitive load on the user for keeping track of the many themes and concepts discussed (Harasim and Winkelmans, 1988; Winkelmans, 1988).

On a general level, this load is due to some of the limitations of the computer conferencing systems as a genre of software. Computer conferencing systems

- provide a fully text-based database of messages, thereby prejudicing against

---

[1]The system provides e-mail and conferencing facilities and allows for both synchronous and asynchronous communication.

[2]The courses are conducted using an interactive design format in which participants become involved in online discussion seminars, and can also participate in informal discussions.

transmitting graphic arts, drama or the sciences where psychomotor practical skills are developed simultaneously with theoretical skills.

- do not provide electronic metaphors for the organizing of ideas in text based materials such as the traditional scissors, Post-it stickers or highlighting for linking or extracting related idea-sized chunks of information in messages sent online by participants in a conference.

- have the ability to organise verbal communication at a global level by providing features for creating "topics" and "subtopics" in which all communicative acts could be stored and retrieved at a subsequent time. But having related ideas organised using the analog form of table of contents, indexes of keywords used in messages, outlines of the general flow of information within a conference, glossaries of terms used by participants and other features for organizing the messages are not built in to the system.

Being aware of these limitations, we began to investigate technological methods which could be used to assess the nature of the interaction that occurs among participants in online courses. One of the approaches that has been tested at the institution to alleviate the problem of threading of ideas is hypertextual analysis of conference transcripts(Harasim and Crichlow; 1989).

This method provided a new research tool for analysing communication pattern among online participants. But it does not empower the user with these functionalities and if the communication act is to be enhanced then these capabilities should be in the hands of the user. The need for interfacing computer conferencing and hypertext systems could be used to give the learner far greater control over the communication and consequently the learning process.

COMPUTER CONFERENCING AND HYPERTEXT

Intrinsically information technologies have no value, but their value lies in their ability to bring change to organisations through improved communication and efficient information management. Through the integration of different technological forms it could be possible to merge the advantages of these different forms into a more effective tool. However, in so doing the designer must be keenly aware of merging technological tools in which the limitations of one are alleviated rather than exacerbated by the other technology. This definition of a "good match" serves as a basis for analysing the manner in which computer conferencing systems could be interfaced with hypertext systems.

In attempting to put order to the messages sent in online conferences a high cognitive load is placed on the user. While the stored messages could serve as an external memory to the participant, there is still a need to externalise the interconnectivity that occurs among the messages. Hypertext systems possess nodes in which idea sized chunks of information can be stored. Further, through the use of linking facilities it is possible to physically link related ideas, browse through the connected ideas and generate a pictorial representation of the connections, capabilities which are not found in conferencing environments. In this way, the cognitive load that is placed on the individual to track related themes is reduced and greater cognitive attention could be on the actual learning process.

The idiosyncratic mode of thinking by individuals suggests that any one representation of the connections among messages in a conference might not coincide

with the learners' perceptions. As a means of maintaining some level of cognitive uniqueness among learners in an online course, it would be more beneficial if each user is able to create his/her own representation of ideas. These can then serve for further explication of ideas among individuals and could serve to enhance the communication process. By providing hypertext interfaces to conferencing systems, such a process could be facilitated.

Messages sent in online conferences often deal with more than one concept in response to a variety of different users. The onus is therefore on the user to not only create and browse through all messages in a conference, but also to develop multiple linkages among messages. Such a process is not supported by current conferencing systems. With hypertext systems such multiple interconnections are facilitated on the themes discussed, by the range of discussants of each theme, on the processes used by participants in interacting with each other and by the overall flow of information in a conferencing.

The emphasis placed on enhancing the communicative act in conferencing systems means that the information retrieval mechanisms provided to the user are not very sophisticated. It is possible for example, to retrieve all messages sent by a specific user, or all messages sent at sent time periods or within specific conferences. What is not not possible, is the retrieval of messages from a conference based on the process used by a user in responding to another participant. Hypertext systems, on the other hand, enable the user to define keywords which would allow both retrieving messages according to a particular content as well as by the process used in interacting with participants. Through the interfacing of computer conferencing and hypertext it seems possible to make the sorting and information retrieval processes more efficient and effective to the end user.

As participants in online conferencing are involved in a dynamic interaction process in which learning strategies are used to advance the knowledge building process (Harasim & Crichlow, 1989), it can be asserted that the medium supports the active or generative learning process. Here the user is involved in using the medium itself for the knowledge building process. It provides a forum for the on-going exchange of ideas. Both the conferencing and hypertext systems provide browsing capabilities to the user, with that provided by hypertext being more efficient. With the merging of these two technologies, not only is more information provided to the user but the active or generative learning process is enhanced through the improved capabilities for exploration.

The power of hypertext systems lie in their ability to integrate existing bodies of information. We should also consider the use of hypermedia systems in which text, audio, video, animations and graphics could be stored. Such capabilities are not available with computer conferencing systems which is essentially text-based. This limitation means that those subject areas which use other storage media apart from text cannot be facilitated in conferencing systems. The joining of hypermedia and conferencing systems would make available to the user a broader spectrum of information than is got with each separately. The main limitation to such an integration would be the wide bandwidth needed to disseminate information stored in hypertext systems which might not be available to the user.

While hypertext systems present new potentials for enhancing learning within the conferencing environment, there are limitations of hypertext systems themselves which need to be addressed. The problems of **disorientation** or lostness that the user feels in browsing a large information base, the absence of **closure** which could indicate to the

user the electronic boundaries of the concept being browsed, the **high cognitive load** that is placed of the user to keep a mental map of the nodes referenced, and the lack of **serendipity** in the system a compared with traditional textual materials all have the potential to exacerbate the cognitive problems that are associated with computer conferencing. However, these limitations of hypertext systems may be easier to alleviate that those of computer conferencing systems.

The high tailorability and extensibility of hypertext systems provides the designer of the information base the opportunity to include features such as guided tours, electronic bookmarks, marginalia for including annotations and of other possibilities. These capabilities are not easily facilitated with conferencing systems. The main limitation to the interfacing of hypertext systems with conferencing systems might lie in the creativity or lack thereof in the designer.

CONCLUSIONS

By examining the design features of computer conferencing systems it has been possible to identify the inherent advantages and disadvantages of using this medium for improved human communication. Research in the area indicates that there is significant potential value in educational settings for such an innovation. However, to fully empower cognitive and affective development of the user it would be necessary to overcome some of the disadvantages of the medium.

It is proposed that one approach to enhancing this medium would be through the interfacing with hypertext systems. An examination of these systems has shown that some of the problems associated with computer conferencing could be reduced with an hypertext interface. It has also been demonstrated that it would be necessary of the designer of the information base in the hypertext system to include such design features that would reduce the limitations of this medium.